REMARKS

Claims 1-8 are pending in the application. Claims 1-6 have been re-written in process format. Claims 7 and 8 have been amended so as to better define the invention. Support may be found on page 3, lines 6-18, and on page 6, lines 25-29 of the specification.

Claims 1-7 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Hill et al. (U.S. 5,990,218) in view of Yoden (U.S. 5,062,904). Claim 8 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Hill et al. (U.S. 5,990,218) in view of Yoden (U.S. 5,062,904) and in view of Salmasi.

Elastomer parts are sometimes used as seals in environments where one or more surfaces of the parts are exposed to plasmas, e.g. as slit valve door seals in a semiconductor wafer manufacturing (i.e. etching) chamber. If the plasma can chemically react with the elastomer material, the plasma is considered a "reactive plasma". Exposure of an elastomer part to a reactive plasma typically causes degradation of the elastomer material. This degradation can cause loss of sealing capability due to a change in the physical properties of the elastomer and/or contamination of the sealed environment by decomposition products generated by reaction of the plasma with the exposed surface of the elastomer part.

One measure of the degree of degradation is the weight loss of an elastomer part due to reactive plasma exposure. However, it is known that the degree of degradation is dependent on a number of factors including: 1) the chemical composition of the elastomer, 2) the chemical composition of the plasma, 3) the nature of any fillers, and amount thereof, present in the elastomer part, 4) the area of the elastomer surface exposed to the plasma, 5) the time period of exposure of the part to the plasma, 6) the plasma power, 7) flow rate into the sealed environment of the gas(es) used to form the plasma and 8) pressure in the sealed environment.

Applicants have surprisingly discovered that a magnetic flux density of at least 10 gauss on the surface of an elastomer part that is exposed to reactive plasma offers some protection to the part from degradation. The degree of protection was determined by comparing the weight loss of two identical elastomer parts (under identical plasma conditions), one part protected by a magnetic flux density of at least 10 gauss and the other part having no magnetic flux density at its exposed surface. Depending on the elastomer parts tested and the plasma conditions employed, parts protected by a magnetic flux density of at

least 10 gauss lost 20-50% less weight than did identical elastomer parts, absent a magnetic flux density at their surface (page 3, lines 6-18 and Examples).

From the above discussion, Applicants hope that the examiner will agree that it would be unfair for Applicants to be required to limit their claimed invention to a specific elastomer part composition, surface area exposed to plasma, plasma composition, plasma conditions (i.e. power, gas flow rate, etc.) and absolute weight loss. Applicants have amended claims 1-8 in order to better define their invention and distinguish it from the prior art.

Hill et al. ('218 patent) disclose magnetic polymer compositions that contain 5-19 parts by weight of a specific type of rubbery thermoplastic polymer (not a thermoset elastomer); 80-90 parts by weight of magnetic powder; and 1-10 parts by weight of an internal lubricant. These compositions are said to be useful in refrigerator and freezer magnetic door seals (col. 1, line 52 - col. 2, line 15). The '218 patent does not disclose exposure of the magnetic compositions to reactive plasmas. The magnetic parts are said to have resistance to ultraviolet light and heat. <u>However, resistance to ultraviolet light and heat is not indicative that the compositions would have resistance to chemical attack by reactive plasmas.</u>

Yoden ('904 patent) discloses means to improve the oxidation stability of ferromagnetic powders employed in magnetic recording media. This is accomplished by exposing ferromagnetic powder to a low temperature plasma in an oxygen atmosphere, thus forming a thin oxide layer on the surface of the ferromagnetic powder. This oxide layer protects the powder from further oxidation (col. 2, lines 41 – 52). The plasma treated ferromagnetic powder may then be mixed with a binder resin to form a coating composition. <u>Neither the binder resin alone, nor in combination with the treated magnetic powder is ever exposed to plasma in Yoden.</u> Yoden does not disclose or suggest a means for protecting the surfaces of binder resins or elastomer parts from reactive plasma induced chemical degradation.

The simple combination of the disclosures of the '218 patent and the '904 patent does not result in Applicants' claimed invention (claims 1-7), nor render it obvious. Applicants' invention is a process for protecting the exposed surface of an elastomer part from reactive plasma induced weight loss (i.e. degradation) by imparting a surface magnetic flux density of at least 10 gauss to the exposed surface. Elastomer parts protected by such a process find particular use in sealing slit valve doors (claim 7) that are exposed to reactive plasma when employed in applications such as semiconductor wafer etching chambers.

Salmasi et al. ('424 patent) disclose an electromagnetic flow meter for measuring the flow of a fluid through a pipe. The meter comprises a flow measurement duct, a magnetic circuit for generating a magnetic field across fluid flowing in the duct, an electrical circuit for measuring a voltage thereby induced in the fluid and for deriving a flow measurement therefrom (col. 1, line 66 – col. 2,line 4). Seals 20 are disposed between the flow tube 16 and meter body 12 at non-magnetic, non permeable flanges 18 (col. 6, lines 1-7). Also, seals 32 are disposed between each spud end 28 and the plastic meter body 12 (col. 7, lines 18-30). No magnets are mounted on flanges 18 or on flanged metal spud end 28. Instead, the magnetic field is generated from soft magnetic upper pole piece 42 which is not in contact with flanges 18 or 28 (col. 9, lines 40 – 42 and Figs 1, 2, and 5). The magnetic field is generated within measurement duct 26 (col. 9, lines 22 – 28) which is located intermediate between the two flanges 18 on non magnetic, nonconductive (i.e. plastic) flow tube 16 (col. 6, lines 8 – 18). It cannot be determined from the disclosures in Salmasi et al. whether a flux density of at least 10 gauss will be imparted on the seals while the electromagnet is energized. The '424 patent does not disclose the possibility of the fluid traveling through the pipe being a reactive plasma that could attack seals 20 and 32. The only mention of "plasma" in the patent is as a means to apply an EMC/RFI shield to the plastic meter body 12 and cover 14 (col. 5, lines 59-62).

The simple combination of the disclosures of the '218 patent, the '904 patent and the '424 patent does not result in Applicants' claimed invention (as defined in amended claim 8), nor render it obvious. Applicants' invention is a pipe flange that is exposed to reactive plasma when in use. The flange has an elastomer part and at least one magnet mounted thereon, said elastomer part having a surface that is protected from reactive plasma induced decomposition by a surface magnetic flux density of at least 10 gauss. This magnetic flux density causes the weight loss (due to plasma induced degradation) of the protected elastomer part to be at least 20% less than the weight loss of an identical non-protected elastomer part (i.e. absent a magnetic flux at its exposed surface) when exposed to identical plasma conditions.

In view of the above remarks, Applicants believe that claims 1-8 are patentable and that the application is in condition for allowance. Reconsideration is requested.

Respectfully submitted,

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